

PATENT APPLN. NO. 10/046,697
RESPONSE UNDER 37 C.F.R. §1.111

PATENT
NON-FINAL

IN THE CLAIMS:

1. (currently amended) A negative electrode for lithium secondary battery, said negative electrode being obtained by sintering a mixture of an active material alloy and a binder arranged on a current collector made of metallic foil, or sintering a mixture of an active material alloy, conductive metal powder and a binder arranged on a current collector made of metallic foil,

wherein said metallic foil has a surface roughness Ra of 0.2
µm or more, and

wherein said active material alloy contains Al, Si and a transition metal and after said sintering process is substantially amorphous such that a halo portion is observed in an X-ray diffraction profile of the alloy and a degree of non-crystallinity of the alloy defined by the following formula is 0.3 or more:

degree of non-crystallinity = maximum peak strength of
halo portion profile/maximum peak strength of entire
profile.

2. (canceled)

3. (canceled)

PATENT APPLN. NO. 10/046,697
RESPONSE UNDER 37 C.F.R. §1.111

PATENT
NON-FINAL

4. (original) The negative electrode for lithium secondary battery according to claim 1, wherein said sintering process is performed by heat treatment in a non-oxidizing atmosphere at a temperature lower than the crystallization temperature of said active material alloy.

5. (canceled)

6. (original) The negative electrode for lithium secondary battery according to claim 1, wherein said metallic foil is an electrolytic copper foil or a metallic foil having an electrolytic copper layer on its surface.

7. (original) The negative electrode for lithium secondary battery according to claim 1, wherein said conductive metal powder is copper or copper alloy powder.

8. (previously presented) A manufacturing method of a negative electrode for lithium secondary battery, comprising the steps of:

disposing a mixture of (a) an active material alloy which is substantially amorphous and a binder, or a mixture of said active

PATENT APPLN. NO. 10/046,697
RESPONSE UNDER 37 C.F.R. §1.111

PATENT
NON-FINAL

material alloy, conductive metal powder and a binder, said active material alloy containing Al, Si and a transition metal, on a current collector made of metallic foil; and

sintering said mixture under a condition such that said active material alloy after said sintering is substantially amorphous such that a halo portion is observed in an X-ray diffraction profile of the alloy and a degree of non-crystallinity of the alloy defined by the following formula is 0.3 or more:

degree of non-crystallinity = maximum peak strength of halo portion profile/maximum peak strength of entire profile.

9. (original) The manufacturing method of a negative electrode for lithium secondary battery according to claim 8, wherein said sintering is performed by heat treatment in a non-oxidizing atmosphere at a temperature lower than the crystallization temperature of said active material alloy.

10. (original) The manufacturing method of a negative electrode for lithium secondary battery according to claim 8, wherein said active material alloy, or said active material alloy and said conductive metal powder are mixed with a solution of said

PATENT APPLN. NO. 10/046,697
RESPONSE UNDER 37 C.F.R. §1.111

PATENT
NON-FINAL

binder to obtain slurry, and the obtained slurry is applied onto said current collector and then dried, and thereby, said mixture is disposed on the current collector.

11. (original) The manufacturing method of a negative electrode for lithium secondary battery according to claim 10, wherein said mixture is rolled together with said current collector after said application and drying process.

12. (canceled)

13. (canceled)

14. (original) The manufacturing method of a negative electrode for lithium secondary battery according to claim 8, wherein said metallic foil has a surface roughness Ra of 0.2 mm or more.

15. (original) The manufacturing method of a negative electrode for lithium secondary battery according to claim 8, wherein said metallic foil is an electrolytic copper foil or a metallic foil having an electrolytic copper layer on its surface.

PATENT APPLN. NO. 10/046,697
RESPONSE UNDER 37 C.F.R. §1.111

**PATENT
NON-FINAL**

16. (original) The manufacturing method of a negative electrode for lithium secondary battery according to claim 8, wherein said conductive metal powder is copper or copper alloy powder.

17. (original) A lithium secondary battery comprising; the negative electrode according to claim 1, a positive electrode and a non-aqueous electrolyte.

18. (original) A lithium secondary battery comprising; the negative electrode manufactured by the method according to claim 8, a positive electrode and a non-aqueous electrolyte.